(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
15 March 2001 (15.03.2001)

PCT

(10) International Publication Number
WO 01/18671 A2

(51) International Patent Classification[7]: G06F 17/00

(21) International Application Number: PCT/IB00/01385

(22) International Filing Date: 8 September 2000 (08.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/391,711 8 September 1999 (08.09.1999) US

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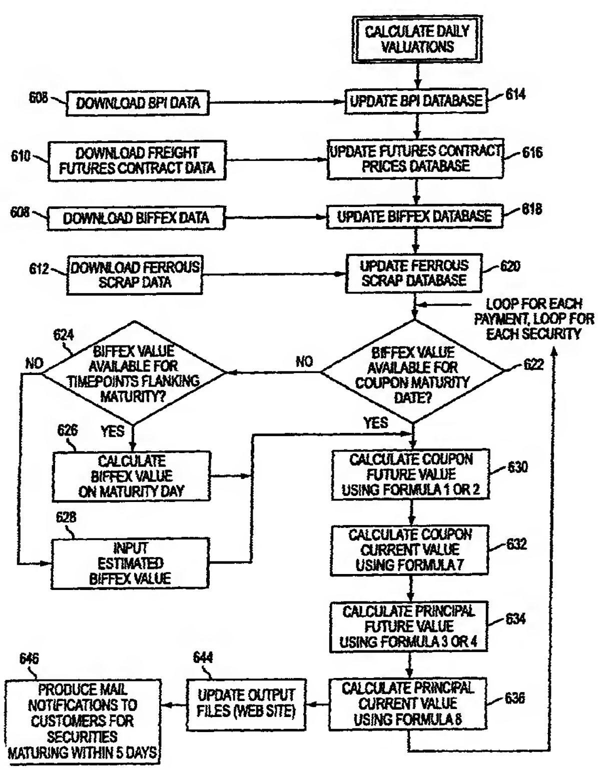
(81) Designated States (*national*): CN, JP, NO.

(84) Designated States (*regional*): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published:
— *Without international search report and to be republished upon receipt of that report.*

(54) Title: FINANCING OF LARGE CAPITAL ASSETS



(57) Abstract: A method of financing a capital asset, for instance a ship in a freight shipping operation. An investor invests a capital contribution. A stream of periodic payments is paid to the investor in a computed amount based on an assumption of steady economic conditions, the stream of periodic payments being distinct from any return-of-capital payments paid to the investor, with an amount of the periodic payments to be increased or reduced according to a first formula agreed in a contract governing the financing, the amount of increase or reduction being based at least in part on a prevailing market freight shipping rate and a market price for used ships in effect at or near the time of the payment, any dependence of the payment amount on the financial performance of the freight shipping operating being less than the dependence on the market rate. A return-of-capital payment is paid to the investor to terminate the financing according to a second formula agreed in the contract, the amount of the return-of-capital payment being based at least in part on the amount of capital contributed, a prevailing market freight shipping rate, and a prevailing scrap rate in effect at the time of the terminating payment.

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FINANCING OF LARGE CAPITAL ASSETS

BACKGROUND

The invention relates to financing of capital assets.

Maritime shipping is divided into three distinct market segments: dry cargo (or dry bulk) relating to goods such as grain, iron ore and coal, the tanker market, transporting oil and its products, and liner shipping, for the transport of containers. Liner shipping is typically operated by cartel-type organizations called conferences, that provide regularly-scheduled service available nearly on demand. Dry cargo and tankers operate in a more competitive market, where shipping dates can be arranged well in advance.

Prices and market conditions in the shipping industry are exceptionally volatile.

A number of indices are compiled for various market segments of the shipping market. For instance, the Baltic Panamax Index ("BPI," Panamax is a class of shipping vessel capable of carrying between 50 and 80 thousand tons of dry bulk, primarily, grain, soya, coal and iron ore) is a basket of spot freight rates along seven representative panamax routes. The Baltic Panamax Index serves as basis for the BIFFEX contract, which is traded at the London International Financial Futures Exchange (LIFFE), Europe's largest financial futures and options exchange. The market trades an idea of the forward value of the BPI, much like the Chicago Mercantile exchange trades an idea of the forward value of the S&P 500 stock index. Other indexes are compiled for dry cargo and tanker rates.

The market value of second-hand ships moves in tandem with freight rates: what the owner of a vessel can charge in order to transport goods to a large extent determines what the value of the vessel is. Thus, the volatility in freight rates is directly reflected in volatility of the values of second-hand ships.

There is relatively little equity financing of ships for maritime transportation. Most ships are financed by conventional loans secured with first preferred mortgages. But because of the volatility of the price of second-hand ships, ship lenders are exposed to more risk than lenders to other businesses. If a bank lends 60-70% of the value of the ship, in a down-market the loan can become under collateralized. Further, a decline in second-hand values is accompanied by lower freight rates, which may render debt servicing difficult.

Moral hazard is the main reason for the lack of equity financing: due to the nature of the industry, minority shareholders and lenders have less control over the finances of the company than they might over similar-size investments in other industries. Because most of a shipping operation is literally offshore of any

jurisdiction, the shipping industry is relatively unregulated. Further, shipowners enjoy substantial tax advantages by incorporating in jurisdictions such as Liberia and Panama, jurisdictions that impose relatively little regulation. In addition, in order to limit liability in cases of collision, pollution or simply default, most ships are owned by companies incorporated offshore for the ownership of a single ship. This legal framework limits minority shareholders' rights and corporate governance. With very few exceptions, shipping has not been accepted to major stock markets.

SUMMARY

In general, in a first aspect, the invention features a method of financing a capital asset of a service business. An investor invests a capital contribution. A payment is paid to the investor according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a market rate for the service provided by the service business, the market rate being a rate in effect at or near the time of the payment, any dependence of the payment amount on the financial performance of the service business being less than the dependence on the market service rate.

In general, in a second aspect, the invention features a method of financing a capital asset of a freight shipping operation. An investor invests a capital contribution. The financing is terminated by a return-of-capital payment paid to the investor according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a prevailing market freight shipping rate, any dependence of the payment amount on the financial performance of the freight shipping operation being less than the dependence on the dependence on the market freight rate.

In general, in a third aspect, the invention features a method of financing a capital asset of a freight shipping operation. An investor invests a capital contribution. The financing is terminated by a return-of-capital payment paid to the investor according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a market scrap rate in effect at or near the time of the payment, any dependence of the payment amount on the financial performance of the freight shipping operation being less than the dependence on the market scrap rate.

In general, in a fourth aspect, the invention features a method of financing a capital asset of a service business. An investor invests a capital contribution. A payment in a stream of periodic payments to be paid to the investor is paid according to a formula agreed in a contract governing the financing, the formula

being based at least in part on the amount of capital contributed and a prevailing market price for an asset of the class financed, the stream of periodic payments being distinct from any return-of-capital payments paid to the investor, any dependence of the payment amount on the financial performance of the freight shipping operation being less than the dependence on the prevailing asset price.

In general, in a fifth aspect, the invention features a method of financing a capital asset of a freight shipping operation. An investor invests a capital contribution. The financing agreement specifies a sequence of periodic payments to be paid to the investor during the tenor of the financing contract, distinct from a return-of-capital payment terminating the contract, in an amount agreed based on an assumption of steady economic conditions, with an agreed reduction reflecting a change in economic conditions.

Preferred embodiments of the invention may include one or more of the following features. The service business may be a freight shipping operation. The asset may be a ship. The market service rate may be a prevailing commercial freight rate. The payment may be one of a sequence of periodic payments paid during the tenor of the financing contract. The payment may be a return-of-capital payment terminating the financing contract. The amount of the payment may be further based on at least in part on a prevailing market price for an asset of the class financed. The formula may be further based on a credit risk of the freight shipping operation. The market rate may be a contract price established by trading in a futures market. The economic condition may be an industry-standard commercial freight rate index in effect at or near the time of a payment in the sequence. The formula may be further dependent on an industry-standard commercial freight rate index. The financing contract may further specify an agreed amount for a return-of-capital payment terminating the financing contract, and an agreed reduction reflecting a change in economic conditions. The financing contract may subordinate the payment to payments in a senior tranche. The investment may be received in a secondary market. The investor may be a passive minority investor in the service business. The stream of payments may be managed by a computer.

Particular embodiments of the invention may feature one or more of the following advantages. The security of the invention allows shipowners to raise equity financing, rather than relying on loan financing. Equity financing reduces exposure to market risks, and improves the ability of shipping operators to weather market downturns. Lenders, such as banks, may take an equity interest rather than a loan interest in the shipping operation. This gives the lender more flexibility, and prevents the lender from having to foreclose and sell the ship at precisely the point

in the market when second-hand ship values are at a low point. Credit risk for investors is reduced because financing costs are linked to the shipping market cycle. Moral hazard is reduced, because lenders and minority shareholders assume market risk, but are largely insulated from the risk of being maltreated by majority shareholders.

Both the coupon and principal payments may be effectively linked to a freight rate index, an index set by the market a reliable, widely accepted as indicating market conditions, and relatively immune to tampering by the parties. This improves the fairness and predictability of the investment contract. The return due to the investor is related to the revenue-generating capacity of the underlying fleet, and the ability of the fleet to generate cash to pay the investor.

Investors are given the opportunity to hedge their exposure to the shipping market, through existing freight-rates futures contracts, such as BIFFEX contracts.

A security of this form facilitates financing of certain kinds of risky capital assets, such as global ocean-going shipping, by matching the return investors in the shipping industry receive with the revenue-generating capacity of the assets funded through their investment. The security creates a mechanism for determining the value of such an investment in the capital asset. The security securitizes the cash-flows from the operation of ocean-going vessels.

Cash flows from a fleet of ships can be securitized. "Securitization" is defined as a transaction in which an investor funds a specific block of assets, rather than the general business of the company. Securitization depends on being able to easily identify and segregate cash-flows from the funded asset. When the asset is offshore and essentially unregulated, the investor may have difficulty determining whether a given transaction by the business is with a related party, whether it is at arms-length, whether certain cost items pertain to the assets funded, whether revenue generated by the asset is properly recorded in company accounts, or whether costs incurred are overstated. Given that operating costs for a fleet of ships are fairly predictable (with the notable exception of fuel oil bunkers, which is not a large cost component), an index of freight rates can be used as an objective and tamper-proof proxy of a fleet's profitability. Therefore, investors funding a fleet of ships can rest assured that profits generated by the assets funded will be available to service debt.

The above advantages and features are only descriptive of representative embodiments, and are presented only to assist in understanding those embodiments. It should be understood that they are not to be considered limitations on the invention as defined by the claims, or limitations on equivalents to the claims.

Additional features and advantages of the invention will become apparent in the following description, from the drawings, and from the claims.

DESCRIPTION OF THE DRAWING

Fig. 1 is a block diagram of a computer system, its inputs, and its outputs.

Fig. 2 is a diagram of database tables.

Figs. 3, 4, 5 and 6 are flowcharts.

DESCRIPTION

A capital asset, such as a ship, may be financed by borrowing from an investor. The investor takes a security. The security pays payments during the life of the security, and a final payment that cashes out the investment. A formula for computing the amount of these payments are agreed between the investor and the operator of the capital asset. The payment amount formula incorporates the risk of market conditions, and largely insulates the investor from the performance of the individual business.

The security is secured via a first preferred mortgage on a fleet of ships. The security pays payments with the following characteristics.

A coupon payment is paid to the investor from time to time by a formula agreed to in the financing contract. The coupon payment will typically vary with the principal value of the security, the period of the coupon, the current value of a freight rate index, and other parameters agreed between lender and issuer. One example formula is (formula 1):

$$C = (a + b\frac{i_t - i_0}{i_0}) \times F$$

where

C	is the coupon payment on the security payable at time t
F	is the face value of the security
i_t	is the value of the freight rates index at time t
i_0	is the value of the freight rates index at the time the security was issued
a	is the risk-free rate of interest for the relevant maturity, plus a risk premium to reflect the credit risk of the issuer
b	is a coefficient contracted between lender and issuer, whose value determines the extent to which the holder of the security is exposed to shipping market risk

The coupon payment may be annual, semi-annual or quarterly, or may be conditioned by certain events, such as a given level of profitability. The coupon

payment is linked to an index of freight rates in the respective market segment (dry cargo, tankers, etc.).

Other formulas are possible. For instance, the formula of formula 1 completely isolates the coupon payment from the financial performance of the asset. If the parties wish, the coupon payment may be computed by a formula that takes the performance of the asset into consideration, giving the lender a quasi-equity stake in the performance of the investment, for instance (formula 2):

$$C = (a + b\frac{i_t - i_0}{i_0} + g\frac{j_t - j_0}{j_0}) \times F$$

where

j_t	is the profitability of the asset over the time period ending at time t
j_0	is an agreed profitability baseline
g	is a coefficient contracted between lender and issuer, whose value determines the extent to which the holder of the security is exposed to the risk of profitability fluctuations of the asset

The principal payment received by the security-holder at maturity is linked to either an index of second-hand values or to an index of freight rates. Since most second-hand value indices are compiled on a constant-age basis, i.e., the indices track the value of a notional fixed-age fleet through time, the aging of the fleet which secures the security should be taken into account.

In one example, the principal payment is computed by formula 3:

$$P = (c + \varepsilon\frac{s_t - s_0}{s_0}) \times F \times (1-d)^t$$

where

P	is the principal payment at maturity
F	is the face value of the security
t	is the tenor of the security, measured in years
d	is the percentage annual loss of value of the fleet attributed to aging
s_t	is the value of the second-hand values index at the time the principal becomes payable
s_0	is the value of the second-hand values index at the time the security was issued
c	is a constant factor, agreed between the parties, that reflects the percentage of face value that will be paid at maturity if $s_0 = s_t$. c will typically be very near 1.
e	is a coefficient contracted between lender and issuer, whose value determines the extent to which the holder of the security is exposed to shipping market risk

In an alternative, the final principal payment may be computed by a formula such as formula 4:

$$P = F \times \left(m \times ((c + \varepsilon \times (k + \rho \frac{i_t - i_0}{i_0})) \times (1 - d)^t) + n \times s_c \times \frac{fs_t - fs_0}{fs_0} \right)$$

where

ρ is an empirically-observed correlation coefficient between annual percentage changes in freight rates and secondary market values

k is an empirically-observed constant factor of the regression equation between second-hand values as the dependent variable and freight rates as the independent one

i_t is the value of the freight rates index at the time the principal becomes payable

i_0 is the value of the freight-rates index at the time the security was issued

fs_t is the value of the ferrous scrap index at the time the principal becomes payable;

fs_0 is the value of the ferrous scrap index at the time the security was issued;

s_c is equal to the current scrap value of the vessel divided by its market value;

m and n are constants, as described below.

This second formula for P (the final principal payment on the security) links the principal repayment to an index of freight rates and to ferrous scrap rates, rather than to secondary values. Because there are far fewer transactions in the second-hand ships market than in the freight market, and there is often no reliable source of information for prices paid for ships, as most of these transactions are carried out offshore, the second formula for P relies on quantities that are more readily observable than the first. Because changes in freight rates and second-hand values are fairly well correlated, the second and first formulas can be made to closely approximate each other.

m and n are constants agreed between the parties, set to balance the contributions of the freight rates and scrap terms of the formula. m and n add to 1. For instance, if m=1 and n=0, then the return-of-principal payment will depend only on the market freight index i_t and not on the scrap index fs_t. If m=0 and n=1, then the return-of-principal payment will be independent of the market freight index i_t, and depend only on scrap index fs_t.

The final principal payment may be linked to an index of ferrous scrap prices, such as the MB Ferrous Scrap Index published by the Metal Bulletin. The value of m will be near zero, and n will be near one, when the tenor of the instrument is approximately equal to the expected remaining useful life of the vessel. The value of a vessel is, theoretically at least, equal to the discounted cash flows from its operation, plus its discounted terminal value, which is effectively its scrap value. Since scrap value is to a large extent determined by the price of ferrous scrap, linking the principal payment to an index of ferrous scrap prices makes the pay-off of the security quite similar to the actual pay-off of operating the vessel. In other words, a security thus structured has returns quite comparable to the returns an equity investor would enjoy. The security holder, however, is relatively insulated from risks arising from lack of protection for minority shareholders.

More terms can be added to the formula for P, to reflect other market forces that determine the second-hand value for ships. For instance, tanker prices vary with the market price of crude oil. During the years that the Suez canal was closed, ship prices dropped, because of their reduced utility relative to other transport mechanisms. Terms could be added to the P formula to reflect any class of foreseeable event, to arrive at a good future estimate for the value of second hand ships in a thinly-traded market.

Secondary markets and derivative securities

These securities, or their stripped coupons or principal payments can be traded on a secondary market. At any given point, the present expected value of the security, coupon, or principal payment can be computed using the appropriate formula from above, discounted to present value. Because there is an active futures market on the freight rates index, a suitable approximation for the future value of i_t can be obtained by using the price of the closing price of the relevant futures contract. If the time t of the payment falls between the expiration dates of two freight rates futures contracts, the value of i_t can be derived by linear interpolation between the two futures contracts. For instance, if t falls m days after one futures contract date and n days before the next, i_t can be approximated by formula 5:

$$i_t \approx i_m + m\frac{i_n - i_m}{m + n}$$

where

i_m is the market's view of the future value of the index at time t minus m days

i_n is the market's view of the future value of the index at time t plus n days

If time t does not fall between the expiration dates of two freight rates futures contracts, then the parties may agree to an estimate of the value of the index at time t.

If the return-of-principal payment is calculated by formula 4, then the expected value of the value of ferrous scrap at time t, fs_t can be calculated according to formula 6:

$$fs_t = fs_i \times e^{(a-q)T/365}$$

where

q	is the cost to carry ferrous scrap;
a	is the annual risk-free rate of interest for the relevant maturity, continuously compounded
fsi	is the value of the ferrous scrap index at point-in-time i, when calculations are made;
T	is the time from time-point i till time-point t, measured in days

Once i_t and/or fs_t is estimated, the security's formula may be used to calculate the expected coupon or principal payment at time t. This estimate is reduced to present value, as follows (formulas 7 and 8):

$$C_V = C_t\,(1-r)^T \qquad\qquad P_V = P_t\,(1-r)^T$$

where

C_V is the present value at time t_V of the expected value of the coupon C_t due at time t

P_V is the present value at time t_V of the expected value of the principal P_t due at time t

r is the discount rate for an obligation of comparable credit quality and risk premium reflecting shipping market risk maturing at time t

T be the time between the present and time t

Securitization makes possible the tranching of a cash flow stream, to allow the servicing of different classes, or tranches, of debt securities. The net cash-flow from a fleet of ships can be divided among tranches — for instance, the first \$100 of each quarter's coupon will go to a first tranche, the second \$100 to the second tranche, and any remaining coupon to a third tranche. Each tranche of debt is effectively secured by a different priority claim on the cash-flow stream, and the risk of each tranche varies accordingly. Risk-averse investors can invest in higher-priority tranches. Investors that seek to increase exposure to shipping market risk can do so by investing in lower-priority tranches.

The coupons may be stripped, and the coupons and return-of-principal securities may trade separately as derivatives.

Linking both coupon and principal payments to the revenue-generating capacity of the assets creates an instrument which can be credit-enhanced by mono-line financial insurers. Financial insurance companies have not so far, and would probably not in the future, agree to underwrite shipping market risk, because of the substantial credit risk inherent in any debt investment in shipping.

However, the credit risk of the security described here is reduced relative to conventional loan or minority equity financing. Further, the credit risk of senior tranches originating from the securitization of the cash-flow from these instruments is even lower.

Let us now assume two companies, A and B, issue securities, such as the ones described above. Let us further assume that the cash-flow from these securities is securitized, and the most senior tranches, A_1 and B_1, are credit enhanced by a mono-line financial insurer. To the investor, the two tranches A_1 and B_1 are now indistinguishable. Should A_1 be more expensive, the investor could short A_1 and purchase B_1 with the proceeds. In other words, the two instruments would be traded in a single market, and would be, for all intents and purposes, fungible. The concept is similar to the mortgaged-backed securities market: the investor is indifferent as to who the ultimate obligor is, or where the underlying mortgaged properties are, so long as they are a reasonably randomly assembled basket approximating the default rate of the market. The investor assumes credit risk of a credit insurer. Thus, the investor can evaluate the mortgage-backed securities, depending on his or her views on interest rates and on likelihood of prepayment.

By introducing mono-line financial insurers to the shipping market, one would hope to create a single market for securitized shipping obligations, in which investors buy or sell securities, depending on their view on the shipping market. The depth and liquidity of such a market would present a significant opportunity to investors and issuers alike.

Implementation Considerations

Referring to Fig. 1, computer 100 for implementing securities includes information interfaces, information storage, and information processing elements. Computer 100 is linked to outside sources, such as financial wire services (608, 610, 612 of Fig. 6), to receive digital financial information, such as market indices and transaction records. Computer 100 produces output in the form of printed reports and/or electronic files. The printed reports include payment notices to issuers, reports to regulatory authorities 112, reports 114, 116 for the back office personnel of the underwriter or bank that makes the market in the securities, and reports 118 for the underwriter's MIS personnel. Point-of-sale network terminals

are used as data-entry and data retrieval stations. The network terminals are used to enter the data of each new issue of debt instrument and to produce reports of existing instruments to be submitted to other financial institutions, governmental authorities, or clients.

Referring to Fig. 2, computer 100 stores historical data on each security outstanding, its financial profile, the mortgaged asset, and data describing the issuer's profile. These are typically stored in relational database tables 200, 210, 220, 240. The database tables are typically managed by open or proprietary database software, such as that available from Oracle, Sybase, Microsoft, or IBM.

A first database table 200 holds information on issuers, on shipowners. Each record 202 in the issuer database holds identification information 204, 206, and a value of a loan risk premium *RPb* 208 associated with that issuer.

A second database table 210 holds profiles of each individual asset, each individual ship. Each record 212 in ship database 210 records asset type, asset name, deadweight tonnage, registry, type of cargo, date built, class and other certificates, mortgage class.

A third database table 220 records ownership interests. Each record 222 in the interest database 220 points to a record in the issuer database 100 and a record in ship database 110, and records the ownership interest of a particular issuer in a particular ship. In addition, an interest record 222 stores a date of acquisition by the issuer, percentage of ownership, the class and priority of the mortgage, and the estimated market value at the date of issue of the security.

A fourth database table 240 records securities. Each record 242 of security database 240 includes the following:

a pointer 244 to a record 122 in ownership interest database 120, which in turn points to the owner 102 and ship 112 backing this security
the currency of the security
the amount credited to the issuer (face value of security) (P)
the number of coupons attached to the security (N)
the lifetime of a coupon (expressed in number of months or days) (T)
the value of freight rates index at the time the security is issued (i_0)
the value of the ferrous scrap index at the time the security is issued (SF_0)
the value of any freight rates futures contract that is outstanding
the risk free rate of interest for the relevant maturity (RF)
the market risk co-efficient (b)

Communications links receive information from outside information systems. Freight rate indexes received may include the Baltic Panamax Index

(BPI), the BIFFEX and other index daily and intra-day data. Currency exchange rates may be received from Reuters, Telerate or Bloomberg. Computer 100 may also communicate with credit scoring databases and services.

The computer 100 also evaluates and marks to market on a daily basis the current value of issued securities, at a coupon and principal level, and records the transactions relating to coupon payments, principal payments and possible mortgage replacement. The daily valuation of each instrument is made available to the investors by means of a database accessible via Internet at a web site set up by the financial entity monitoring and evaluating the securities.

Creation of the security

Referring to Fig. 3, a security is created when the parties agree on the terms of the security — the parties agree on the asset that is being mortgaged, the initial face value of the security, the tenor, and the parameters of the formulas. After the terms of the instrument have been agreed upon, a record of the security is created in computer 100, by entering the parameters of the coupon and principal payment formulas (formulas 1-6) known to the parties at that time, and the values of the fields of security profile record 242.

In step 310, computer 100 checks the issuer database 200 to see whether a profile record corresponding to this issuer exists. If a issuer profile record 202 exists, *RPb* 208 is retrieved automatically. Otherwise, a new issuer profile record 202 is created in issuer database 200 and updated with the calculated *RPb* 208 of the issuer (step 312). Issuers' *RPb* premia 208 may be estimated using a relevant credit-scoring system, or by using financial information from third-party sources.

In step 320, the ship database 210 and ownership interest database 220 are queried and updated with the issuer's assets that are mortgaged against the issued security. If this is a new asset to the market for the securities, then computer 100 asks questions to determine information to create a new asset profile record 212 (step 322).

Step 400, updating ship database 210, is shown in detail in Fig. 4. First, ship database 210 is queried to see whether this is a ship new to the system, or whether a pre-existing ship record 212 exists (step 404). If no pre-existing ship record 212 exists, then a ship record 212 is created (step 406). The newly-created or pre-existing record 212 is filled with data obtained by querying a user (step 410). If a pre-existing record 212 is being replaced, then security database 140 may need to be updated, to keep ownership interests and securities associated with their underlying assets.

A new profile record 242 in the security database is created (step 324). This profile record 242 contains a pointer to the database record 222 for the interest pledged against the security (recall that record 222 has pointers that, in turn, link the security to the issuer 202 and to the underlying ship 212).

After security profile record 242 is created, it is validated by a senior officer of the financial institution, using a secure command. The validation of security profile record 242 includes tracing of logical errors in the data profile, the existence of an issuer's profile record 102 in issuer database 200, credit line overdrafts (if any) linked to the issuer and the existence of the asset profile record 212 in ship database 210.

The security is then assigned a unique identification code (ISIN, CUSIP or Common Code) by which it is referred to (step 326), quoted and monitored throughout its lifetime. If the security is declared as strippable, unique identification codes are assigned to each tradeable coupon as well.

The profile 242 of the security issued can be electronically transmitted to the settlement agent or back office operations of the financial institution to facilitate settlement of the transaction.

Transactions affecting the security

The transactions affecting the security are coupon payments, principal repayment, exchange of mortgaged asset and default in payment.

As each coupon payment comes due, the amount of the payment is calculated by computer 100 according to the formula agreed upon by lender and issuer, for instance formulas 1 and 2. Similarly, at the expiration of the security, the amount payable in settlement of the principal is calculated by the system according to the formula agreed by the parties, for instance formulas 3 or 4. Since the calculation of the exact amount depends on the value of the Index on payment date (i.e. typically the value of the Index at the closing of the previous working day), the amount payable can normally be approximated a few days before payment, but can only be finalized after the closing of the business day prior to the payment.

Referring to Fig. 5, when payments are received, the payment is matched up with a particular security and a particular coupon or return-of-principal payment (step 504). The appropriate payment is marked "paid" in the security database 140 (steps 506, 508). If this was a final return-of-principal payment, then computer 100 checks to see that all coupons are also paid (step 510). If all payments are complete, the security is retired, and the mortgage is released by appropriately updating databases 120, 140 (steps 512, 514). On the other hand, if there are payments outstanding or left to come due, then the appropriate notifications are sent

to the bank's back office, and other appropriate reports are generated (steps 516, 518). If the security is in default, then appropriate notifications are generated to the bank's back office and to the issuer (step 520).

The system issues daily reports to the financial institution, for instance based on BPI or other freight rates, ferrous scrap indices, and other market values, with the payments due for each working day. Payment by the issuer will typically be effected via the clearing system of the market in which the security is traded. The clearing house of the specific market will acknowledge receipt of funds and will, in turn, credit the registered holders of the security with their respective amounts canceling the paid for coupons or principal and will notify the financial institution accordingly. The notification of payment is entered into the system and the security database 240 is updated accordingly.

Referring again to Fig. 4, in case of an agreed replacement of the mortgaged asset, the substituted asset is de-linked from the issued security (link 244), the new (replacing) securing asset is entered in the "securing assets" database 210 and the security's profile in the "security database" 240 is updated and linked to the new mortgaged asset (step 410-412).

In case of a default in the payment of any coupons or the principal, the system flags the securities as unpaid and starts calculating the default rate of interest from the default date onwards. On default date, the unpaid asset is reported to the financial institution and the mortgaged asset in the "securing assets" database 210 is "charged" with the unpaid amount. The legal action to be taken for the liquidation of the mortgage can be fully supported by the system in terms of financial details. (e.g. the defaulted security, the outstanding amount, the breakdown of debt into face value, accrued interest, default interest, the foreign exchange adjustments (if any), the mortgaged asset and the issuer).

Valuation of securities

Referring to Fig. 6, to calculate the instantaneous market value of the issued securities, the system calculates the present value of the best available estimates for all remaining coupons and the final principal payment. This calculation is based on a number of parameters, some of which fluctuate continuously while others may need to be re-calculated periodically for verification reasons. The continuously-fluctuating parameters are the freight rates index value and the currencies' exchange rates. The periodically re-calculated parameters are the correlation coefficient between annual percentage changes in freight rates and second-hand values (variable ρ in formula 4), the constant factor of the regression formula between second-hand values and freight rates (variable k in formula 4).

Computer 100 can evaluate the value of the securities more or less continuously, and at least daily, by executing the following automated procedure:

i. periodically recalculate the values of ρ (correlation coefficient between freight rates and second-hand values) and k (the constant factor of the regression formula between second-hand values and freight rates)

ii. Continuously download freight rates indices (e.g., BFI, BPI and/or BIFFEX) (step 608), freight rates futures contracts (step 610), ferrous scrap index data (step 612), and interest rate data from an external link to a market news source.

ii. Update databases that track the closing values of the series downloaded in steps 608-612, major currencies' exchange rates, and the like (steps 614, 616, 618, 620).

If any coupons or return-of-principal payments fall between futures contracts closing dates (query 622), then intermediate values of the contracts may be interpolated between the two futures closing dates (steps 624, 626, 628).

The present value of the outstanding coupons and the final return-of-principal payment are calculated by the appropriate formula. Typically, the future value of the coupon or return-of-principal payment will be calculated by the contracted formula, typically formula 1, 2, 3 or 4, and then reduced to present value by formula 7 or 8 (steps 630, 632, 634, 636). Then this present value can be converted into the appropriate currency, using the FX database.

To compute the total present value of each security, the program loops over all outstanding payments for the security, and sums the present values.

The program loops over all securities, to compute the values (loop arc 640).

The calculated nominal and present values of each coupon and the calculated nominal and present values of the principal of each security are appended onto a "output database" which can be accessed by third parties in a read-only mode (step 644). This database will typically reside on the financial institution's web server, providing selective access to third parties. The output database is updated daily and holds historical valuations of all the issued securities, both in circulation and already matured.

The calculated values may be broadcast to external sources, for instance, Telerate, Reuters, Bloomberg, etc.

Daily batch operations

After the closing of the business day, the financial institution processes and enters into the system all transaction data related to the securities.

All of the data concerning the securities generated by the clearing houses are entered into the system, be download from the clearing house's computers.

Statements and invoices are prepared and sent to the issuers, reminding them of coupon and return-of-principal payments due in some arranged amount of time, for instance five days' notice and on the following working day (step 646).

The ship database 210 and issuer database 200 are updated with any additional information received during that working day.

The system recalculates values of variables ρ and k of formula 4, based on information received during the day.

The system produces reports on upcoming maturities of coupons and principal amounts for the next five working days, in a "Forthcoming maturity log."

The system produces a "Payment Report" and a "Default Report" that report the paid and default amounts of the coupons and principal amounts that matured on the previous working day.

Reporting facilities

The system accepts queries to produce extra reports and support what-if scenarios.

At the user's queried request, the system can produce tables of historical data, default tables or data on the credit worthiness of issuers based on the rate of default.

The system can also accept experimental forecasting data to calculate what-if scenarios. To run this operation, actual database data are available to the system users in a read-only basis. A user inputs expected future values for the variables for the formulas defining the security (for instance, formulas 1-4). Computer 100 executes the formulas to estimate values of i_t and fsi for the times of the remaining coupon and return-of-principal payments, to generate and display a series of estimated future cash flows of a coupon or a series of coupons.

The user may request computer 100 to reduce these payments to present value, and sums them to estimate a current value of the security.

This operation used in conjunction with the ship database 210 can calculate the estimated cash flow generated by securities related to specific assets. To achieve this, the user selects a set of assets in the ship database 210. Then, the user asks the system to identify all securities with a mortgage to the flagged assets, that is, all records 242 in security database 240 that have a two-level link 244, 226 to one of the selected assets. Then, the system executes the steps of the preceding two paragraphs, to generate the set of cash flows and sum their present values.

Since the system is based on RDBMS databases, structured queries can be written and stored in the system to produce "standard" reports 110, 112, 114, 116 for the most commonly used tasks.

It should be understood that the above description is only illustrative of representative embodiments. One of ordinary skill will appreciate that many embodiments not specifically described are within the literal scope of the following claims, and others are equivalent.

I claim:

CLAIMS

1. A method, comprising:

receiving a capital contribution from an investor to finance a ship for a freight shipping operation;

computing a payment in a stream of periodic payments to be paid to the investor in an amount based on an assumption of steady economic conditions, the stream of periodic payments being distinct from any return-of-capital payments paid to the investor, with an amount of the periodic payments to be increased or reduced according to a first formula agreed in a contract governing the financing, the amount of increase or reduction being based at least in part on a prevailing market fright shipping rate and a market price for used ships in effect at or near the time of the payment, any dependence of the payment amount on the financial performance of the freight shipping operating being less than the dependence on the market rate;

computing a return-of-capital payment to be paid to the investor to terminate the financing according to a second formula agreed in the contract, the amount of the return-of-capital payment being based at least in part on the amount of capital contributed, a prevailing market freight shipping rate, and a prevailing scrap rate in effect at the time of the terminating payment.

2. A method, comprising:

receiving a capital contribution from an investor to finance a capital asset of a service business;

computing an amount of a payment to be paid to the investor according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a market rate for the service provided by the service business, the market rate being a rate in effect at or near the time of the payment, any dependence of the payment amount on the financial performance of the service business being less than the dependence on the market service rate.

3. The method of claim 2, wherein the service business is a freight shipping operation and the market service rate is a prevailing commercial freight rate.

4. The method of claim 3, wherein the asset is a ship.

5. The method of claim 3, wherein the market rate for the service is an industry-standard commercial freight rate index.

6. The method of claim 5, wherein the payment is one of a sequence of periodic payments paid during the tenor of the financing contract.

7. The method of claim 5, wherein the payment is a return-of-capital payment terminating the financing contract.

8. The method of claim 3, wherein the formula is further based on a market scrap rate in effect at or near the time of the payment

9. The method of claim 3, wherein the payment is one of a sequence of periodic payments paid during the tenor of the financing contract.

10. The method of claim 9, wherein the formula for the amount of the payment is further based on at least in part on a prevailing market price for an asset of the class financed.

11. The method of claim 3, wherein the payment is one of a sequence of payments to be paid periodically during the tenor of the financing contract, in an amount agreed based on an assumption of steady economic conditions, with an agreed reduction reflecting a change in economic conditions.

12. The method of claim 3, wherein the formula is further based on a credit risk of the freight shipping operation.

13. The method of claim 3, wherein the market rate is a contract price established by trading in a futures market.

14. The method of claim 3, wherein the financing contract subordinates the payment to payments in a senior tranche.

15. The method of claim 3, wherein the investment is received in a secondary market.

16. The method of claim 3, wherein the investor is a passive minority investor in the service business.

17. A method, comprising:

contributing a capital investment to finance a capital asset of a service business;

receiving a payment computed according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a market rate for the service provided by the service business, the market rate being a rate in effect at or near the time of the payment, any dependence of the payment amount on the financial performance of the service business being less than the dependence on the market service rate.

18. A computer programmed to:

compute an amount of a payment to be paid to an investor according to a formula agreed in a contract governing a financing of a capital asset of a service business, the formula being based at least in part on the amount of capital contributed and a market rate for the service provided by the service business, the market rate being a rate in effect at or near the time of the payment, any dependence of the payment amount on the financial performance of the service business being less than the dependence on the market rate.

19. The computer of claim 18, wherein the service business is a freight shipping operation.

20. The computer of claim 19, wherein the asset is a ship.

21. The computer of claim 19, wherein the market rate for the service is an industry-standard commercial freight rate index.

22. The computer of claim 21, wherein the payment is one of a sequence of periodic payments paid during the tenor of the financing contract.

23. The computer of claim 21, wherein the payment is a return-of-capital payment terminating the financing contract.

24. The computer of claim 19, wherein the formula is further based on a market scrap rate in effect at or near the time of the payment

25. The computer of claim 19, wherein the payment is one of a sequence of periodic payments paid during the tenor of the financing contract.

26. The computer of claim 9, wherein the formula for the amount of the payment is further based on at least in part on a prevailing market price for an asset of the class financed.

27. The computer of claim 19, wherein the payment is one of a sequence of payments to be paid periodically during the tenor of the financing contract, in an amount agreed based on an assumption of steady economic conditions, with an agreed reduction reflecting a change in economic conditions.

28. The computer of claim 19, wherein the formula is further based on a credit risk of the freight shipping operation.

29. The computer of claim 19, wherein the market rate is a contract price established by trading in a futures market.

30. The computer of claim 19, wherein the financing contract subordinates the payment to payments in a senior tranche.

31. The computer of claim 19, wherein the investment is received in a secondary market.

32. A method, comprising:

receiving a capital contribution from an investor to finance an asset of a freight shipping operation;

computing an amount of a return-of-capital payment terminating the financing to be paid to the investor according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a prevailing market freight shipping rate, any dependence of the payment amount on the financial performance of the freight shipping operation being less than the dependence on the dependence on the market freight rate.

33. The method of claim 32, wherein the asset is a ship.

34. The method of claim 32, wherein the formula is further based on a market scrap rate in effect at or near the time of the payment

35. The method of claim 32, wherein the formula is further based on a credit risk of the freight shipping operation.

36. The method of claim 32, wherein the market freight rate is a contract price established by trading in a futures market.

37. The method of claim 32, wherein the financing contract subordinates the payment to payments in a senior tranche.

38. The method of claim 32, wherein the investment is received in a secondary market.

39. The method of claim 32, wherein the investor is a passive minority investor in the freight shipping operation.

40. A method, comprising:

contributing a capital investment to finance an asset of a freight shipping operation;

receiving a return-of-capital payment terminating the financing, computed according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a prevailing market freight shipping rate, any dependence of the payment amount on the financial performance of the freight shipping operation being less than the dependence on the dependence on the market freight rate.

41. A method, comprising:

receiving a capital contribution from an investor to finance an asset of a freight shipping operation;

computing an amount of a return-of-capital payment terminating the financing to be paid to the investor according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a market scrap rate in effect at or near the time of the payment, any dependence of the payment amount on the financial performance of the freight shipping operation being less than the dependence on the market scrap rate.

42. The method of claim 33, wherein the asset is a ship.

43. The method of claim 33, wherein the formula for the amount of the payment is further based on at least in part on a prevailing market price for an asset of the class financed.

44. The method of claim 33, wherein the amount of the payment is agreed based on an assumption of steady economic conditions, with an agreed reduction reflecting a change in economic conditions.

45. The method of claim 33, wherein the formula is further based on a credit risk of the freight shipping operation.

46. The method of claim 33, wherein the market rate is a contract price established by trading in a futures market.

47. The method of claim 33, wherein the financing contract subordinates the payment to payments in a senior tranche.

48. The method of claim 33, wherein the investment is received in a secondary market.

49. The method of claim 33, wherein the investor is a passive minority investor in the freight shipping operation.

50. A method, comprising:

investing a capital contribution to finance an asset of a freight shipping operation;

receiving a return-of-capital payment terminating the financing computed according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a market scrap rate in effect at or near the time of the payment, any dependence of the payment amount on the financial performance of the freight shipping operation being less than the dependence on the market scrap rate.

51. A method, comprising:

receiving a capital contribution from an investor to finance a capital asset of a service business;

computing a payment in a stream of periodic payments to be paid to the investor according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a prevailing market price for an asset of the class financed, the stream of periodic payments being distinct from any return-of-capital payments paid to the investor, any dependence of the payment amount on the financial performance of the freight shipping operation being less than the dependence on the prevailing asset price.

52. The method of claim 43, wherein the service business is a freight shipping operation.

53. The method of claim 44, wherein the asset is a ship.

54. The method of claim 44, wherein the formula is further dependent on an industry-standard commercial freight rate index.

55. The method of claim 44, wherein the payment is in an amount agreed based on an assumption of steady economic conditions, with an agreed reduction reflecting a change in economic conditions.

56. The method of claim 44, wherein the formula is further based on a credit risk of the freight shipping operation.

57. The method of claim 44, wherein the market rate is a contract price established by trading in a futures market.

58. The method of claim 44, wherein the financing contract subordinates the payment to payments in a senior tranche.

59. The method of claim 44, wherein the investment is received in a secondary market.

60. The method of claim 44, wherein the investor is a passive minority investor in the freight shipping operation.

61. A method, comprising:

investing a capital contribution to finance a capital asset of a service business;

receiving a payment in a stream of periodic payments computed according to a formula agreed in a contract governing the financing, the formula being based at least in part on the amount of capital contributed and a prevailing market price for an asset of the class financed, the stream of periodic payments being distinct from any return-of-capital payments paid to the investor, any dependence of the payment amount on the financial performance of the freight shipping operation being less than the dependence on the prevailing asset price.

62. A method, comprising:

receiving a capital contribution from an investor to finance an asset of a freight shipping operation,

a financing agreement specifying a sequence of periodic payments to be paid to the investor during the tenor of the financing contract, distinct from a return-of-capital payment terminating the contract, in an amount agreed based on an assumption of steady economic conditions, with an agreed reduction reflecting a change in economic conditions.

63. The method of claim 54, wherein the asset is a ship.

64. The method of claim 54, wherein the economic condition is an industry-standard commercial freight rate index in effect at or near the time of a payment in the sequence.

65. The method of claim 56, wherein the financing contract further specifies an agreed amount for a return-of-capital payment terminating the financing contract, and an agreed reduction reflecting a change in economic conditions.

66. The method of claim 54, wherein the economic condition is a market scrap rate in effect at or near the time of a payment in the sequence

67. The method of claim 54, wherein the formula is further based on a credit risk of the freight shipping operation.

68. The method of claim 54, wherein the market rate is a contract price established by trading in a futures market.

69. The method of claim 54, wherein the financing contract subordinates a payment in the sequence to payments in a senior tranche.

70. The method of claim 54, wherein the investment is received in a secondary market.

71. A method, comprising:

investing a capital contribution to finance an asset of a freight shipping operation,

receiving a sequence of periodic payments during the tenor of the financing contract, distinct from a return-of-capital payment terminating the contract, in an

amount agreed based on an assumption of steady economic conditions, with an agreed reduction reflecting a change in economic conditions.

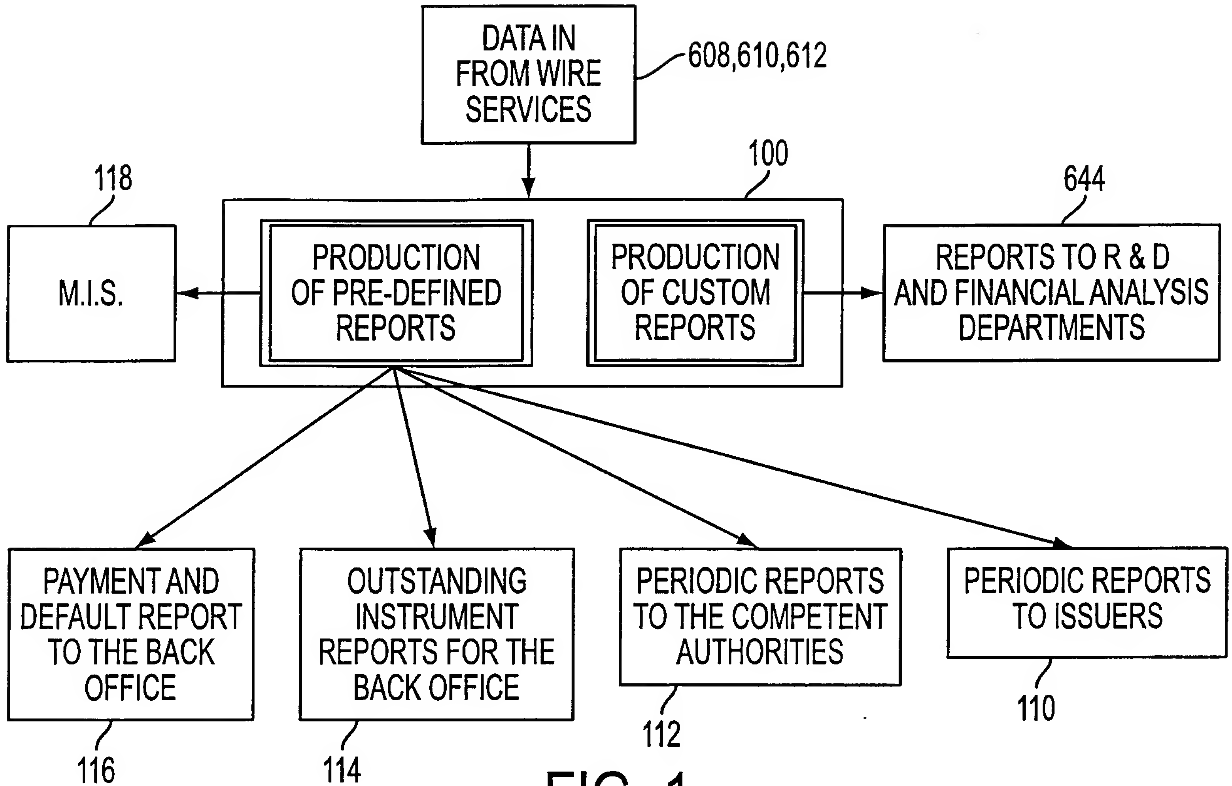
DATA IN FROM WIRE SERVICES
608,610,612
100
118
M.I.S.
PRODUCTION OF PRE-DEFINED REPORTS
PRODUCTION OF CUSTOM REPORTS
644
REPORTS TO R & D AND FINANCIAL ANALYSIS DEPARTMENTS
PAYMENT AND DEFAULT REPORT TO THE BACK OFFICE
116
OUTSTANDING INSTRUMENT REPORTS FOR THE BACK OFFICE
114
PERIODIC REPORTS TO THE COMPETENT AUTHORITIES
112
PERIODIC REPORTS TO ISSUERS
110

FIG. 1

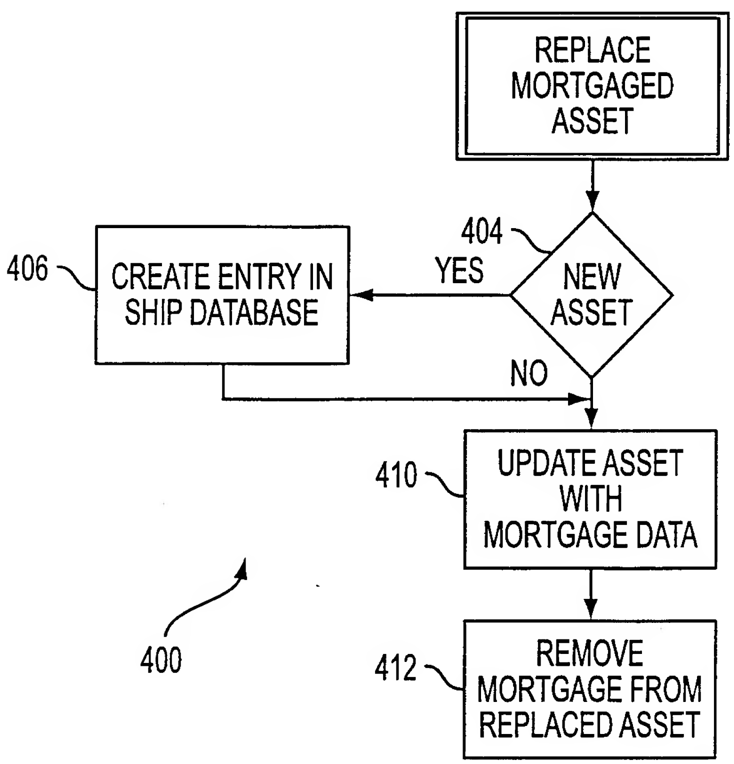
REPLACE MORTGAGED ASSET
404
NEW ASSET
YES
406
CREATE ENTRY IN SHIP DATABASE
NO
410
UPDATE ASSET WITH MORTGAGE DATA
412
REMOVE MORTGAGE FROM REPLACED ASSET
400

FIG. 4

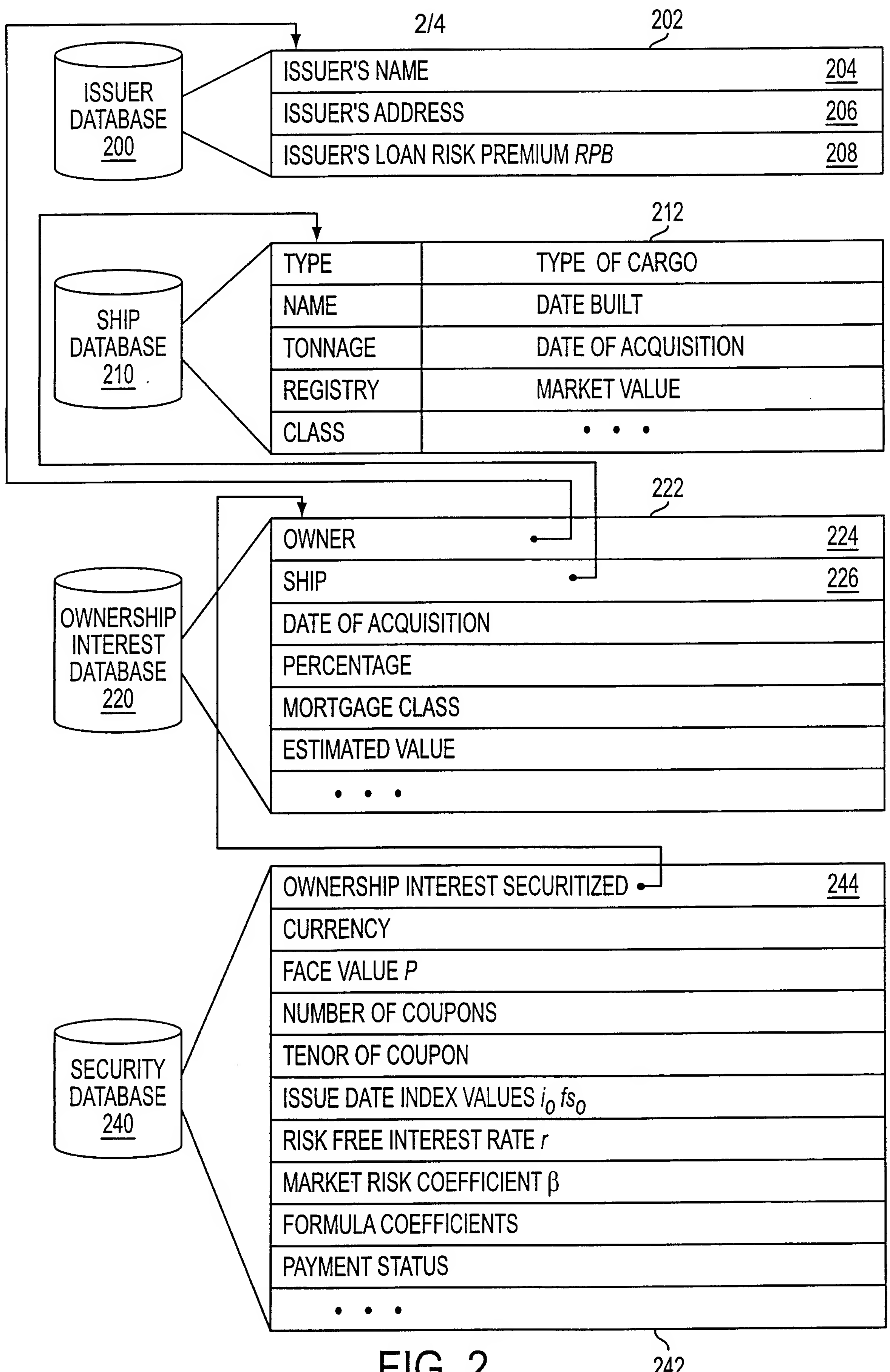
202
ISSUER DATABASE 200
ISSUER'S NAME 204
ISSUER'S ADDRESS 206
ISSUER'S LOAN RISK PREMIUM RPB 208
212
SHIP DATABASE 210
TYPE
TYPE OF CARGO
NAME
DATE BUILT
TONNAGE
DATE OF ACQUISITION
REGISTRY
MARKET VALUE
CLASS
222
OWNERSHIP INTEREST DATABASE 220
OWNER 224
SHIP 226
DATE OF ACQUISITION
PERCENTAGE
MORTGAGE CLASS
ESTIMATED VALUE
SECURITY DATABASE 240
OWNERSHIP INTEREST SECURITIZED 244
CURRENCY
FACE VALUE P
NUMBER OF COUPONS
TENOR OF COUPON
ISSUE DATE INDEX VALUES i_0 fs_0
RISK FREE INTEREST RATE r
MARKET RISK COEFFICIENT β
FORMULA COEFFICIENTS
PAYMENT STATUS
242

FIG. 2

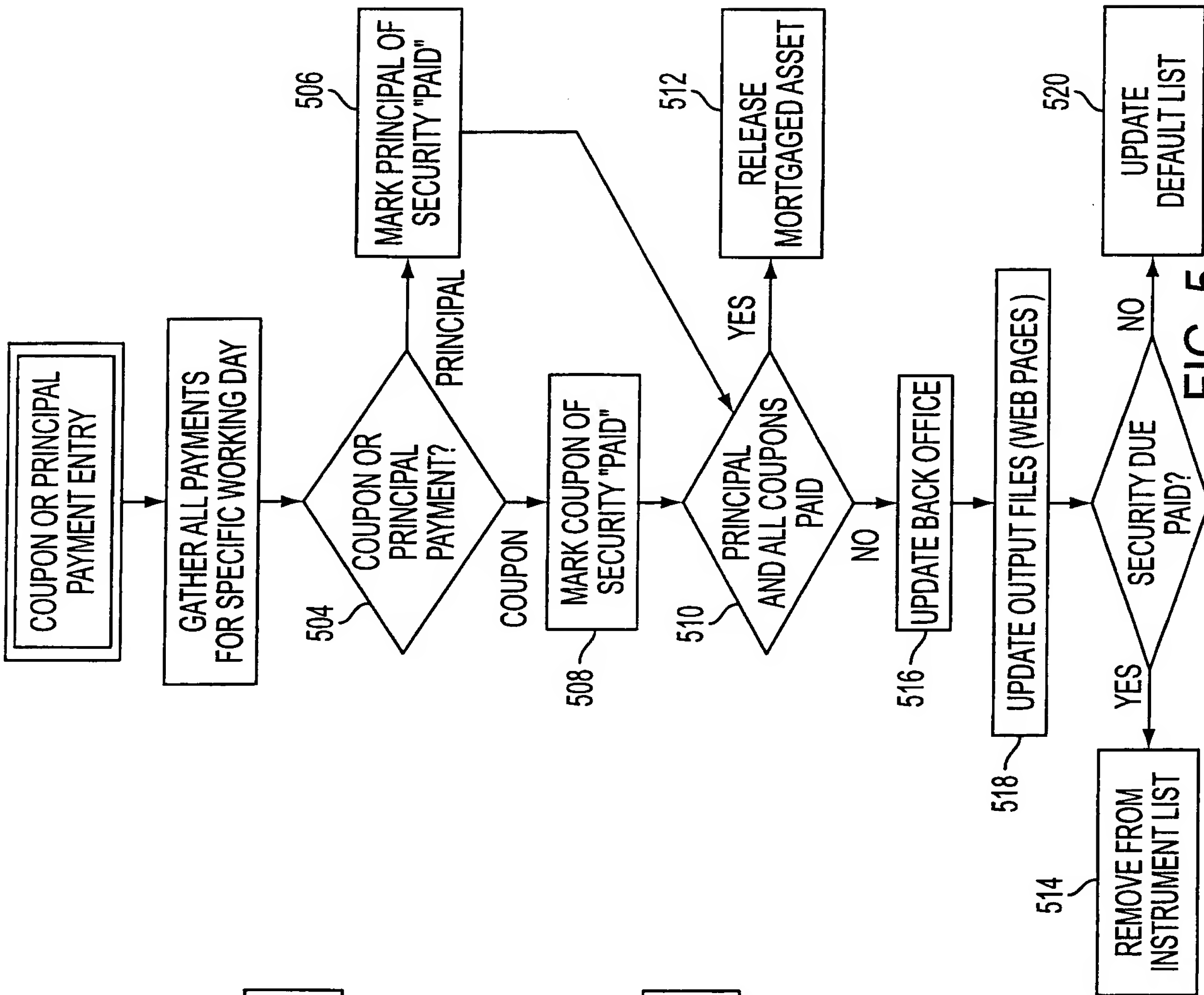
COUPON OR PRINCIPAL PAYMENT ENTRY
GATHER ALL PAYMENTS FOR SPECIFIC WORKING DAY
504
COUPON OR PRINCIPAL PAYMENT?
PRINCIPAL
COUPON
506
MARK PRINCIPAL OF SECURITY "PAID"
508
MARK COUPON OF SECURITY "PAID"
510
PRINCIPAL AND ALL COUPONS PAID
YES
NO
512
RELEASE MORTGAGED ASSET
516
UPDATE BACK OFFICE
518
UPDATE OUTPUT FILES (WEB PAGES)
SECURITY DUE PAID?
YES
NO
514
REMOVE FROM INSTRUMENT LIST
520
UPDATE DEFAULT LIST

FIG. 5

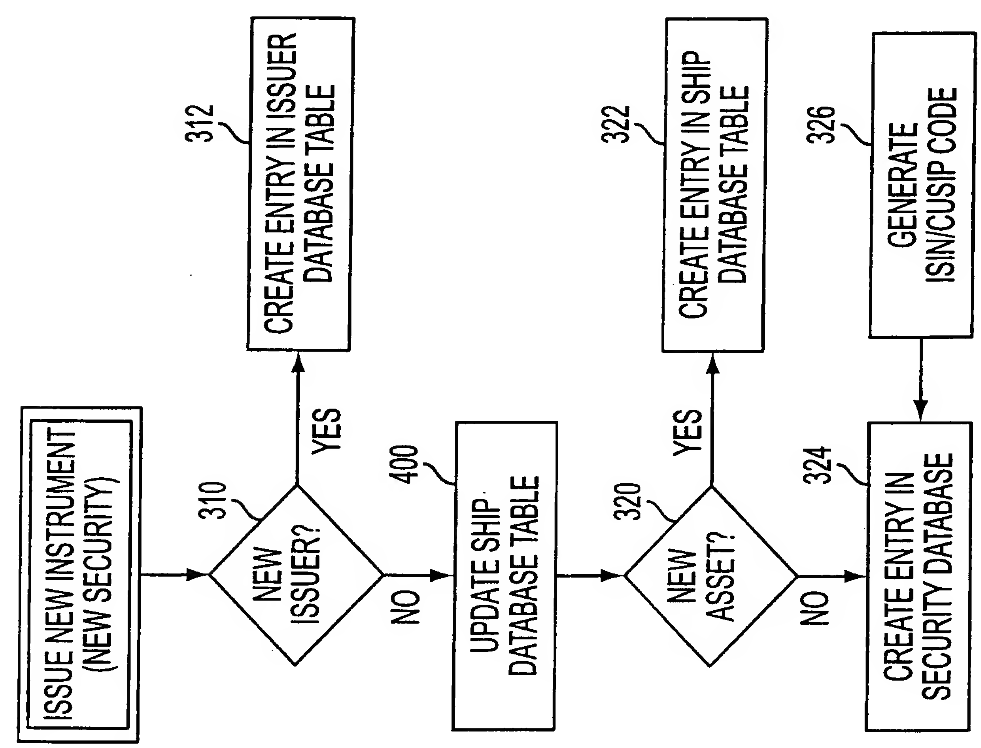
ISSUE NEW INSTRUMENT (NEW SECURITY)
310
NEW ISSUER?
YES
NO
312
CREATE ENTRY IN ISSUER DATABASE TABLE
400
UPDATE SHIP DATABASE TABLE
320
NEW ASSET?
YES
NO
322
CREATE ENTRY IN SHIP DATABASE TABLE
326
GENERATE ISIN/CUSIP CODE
324
CREATE ENTRY IN SECURITY DATABASE

FIG. 3

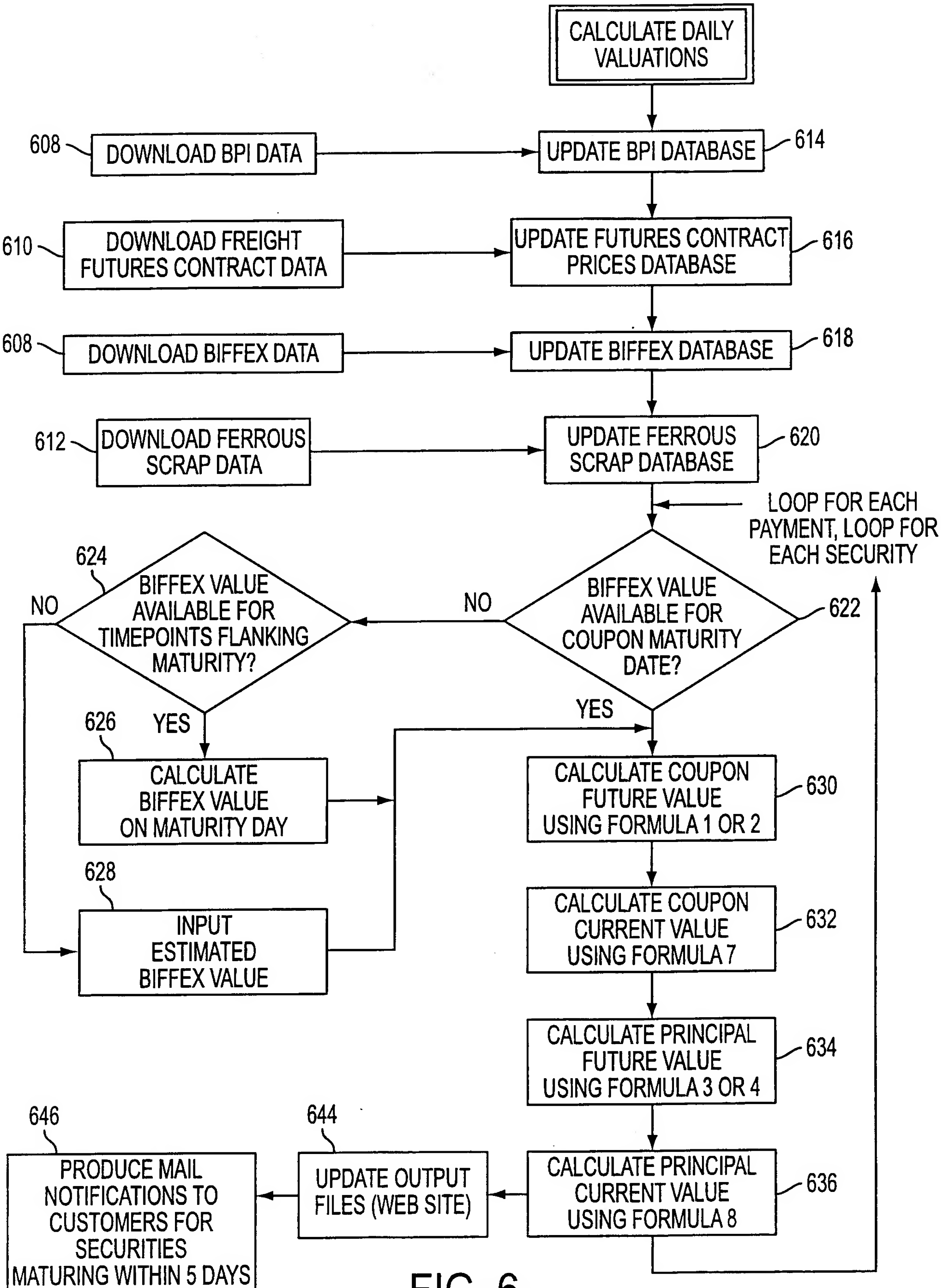
CALCULATE DAILY VALUATIONS
608 DOWNLOAD BPI DATA
UPDATE BPI DATABASE 614
610 DOWNLOAD FREIGHT FUTURES CONTRACT DATA
UPDATE FUTURES CONTRACT PRICES DATABASE 616
608 DOWNLOAD BIFFEX DATA
UPDATE BIFFEX DATABASE 618
612 DOWNLOAD FERROUS SCRAP DATA
UPDATE FERROUS SCRAP DATABASE 620
LOOP FOR EACH PAYMENT, LOOP FOR EACH SECURITY
BIFFEX VALUE AVAILABLE FOR COUPON MATURITY DATE? 622
NO
YES
624 BIFFEX VALUE AVAILABLE FOR TIMEPOINTS FLANKING MATURITY?
NO
YES
626 CALCULATE BIFFEX VALUE ON MATURITY DAY
628 INPUT ESTIMATED BIFFEX VALUE
CALCULATE COUPON FUTURE VALUE USING FORMULA 1 OR 2 630
CALCULATE COUPON CURRENT VALUE USING FORMULA 7 632
CALCULATE PRINCIPAL FUTURE VALUE USING FORMULA 3 OR 4 634
CALCULATE PRINCIPAL CURRENT VALUE USING FORMULA 8 636
644 UPDATE OUTPUT FILES (WEB SITE)
646 PRODUCE MAIL NOTIFICATIONS TO CUSTOMERS FOR SECURITIES MATURING WITHIN 5 DAYS

FIG. 6